

Listing of Claims

Claims 1-16 (Canceled).

17. (Currently amended) A method for bonding laminae together to form a device, comprising:

providing a thermally assisted bonding unit comprising at least one fluid expansion unit;

loading laminae in the thermally assisted bonding unit;

placing the thermally assisted bonding unit and laminae in a furnace;

heating the laminae and the bonding unit in the furnace, where the laminae are heated to ± 50 °C of a bonding temperature; and

applying a bonding pressure to the laminae using the thermally assisted bonding unit, wherein a timing application of the bonding pressure is determined by adjusting fluid mass in the fluid expansion unit.

Claim 18 (Canceled).

19. (Original) The method according to claim 17 further comprising using a conveyorized furnace for applying heat to laminae functionally associated with the bonding unit.

20. (Original) The method according to claim 17 further comprising forced convective heating of the laminae, forced convective cooling of the laminae or both, using a gas.

21. (Original) The method according to claim 20 where the gas is an inert gas.

22. (Original) The method of claim 20 where the gas is contained in the unit.

23. (Original) The method according to claim 17 further comprising thermally registering plural lamina using a registration fixture prior to bonding laminae.

24. (Currently amended) A method for bonding laminae together to form a device, comprising:

providing a thermally assisted bonding unit comprising at least one fluid expansion unit; thermally registering plural laminae using a registration fixture prior to bonding laminae, where the registration fixture includes flexible laminae engagement portions that flex when displaced by expanding laminae; and[[.]]

bonding laminae together using the device.

25. (Original) The method according to claim 24 where at least one lamina in a stack includes a thermal registration element.

26. (Original) The method according to claim 25 where the registration element is integral with the lamina.

27. (Original) The method according to claim 26 where integral with the lamina comprises embedded in the lamina.

28. (Original) The method according to claim 25 where plural laminae include registration elements.

Claim 29 (Canceled).

30. (Currently amended) The method according to claim [[29]] 24 where the thermally assisted bonding unit further includes at least one pressure regulating spring, and where laminae are positioned between the at least one pressure regulating spring and the at least one fluid expansion unit.

31. (Previously presented) The method according to claim 30 where bonding laminae comprises applying bonding pressure stored in the at least one spring to the laminae.

32. (Previously presented) The method according to claim 30 where bonding laminae comprises heating the thermally assisted bonding unit, the heat causing an engager to expand such that at a given time after heating, the engager engages laminae.

33. (Previously presented) The method according to claim 32 where at the time the engager engages the laminae, final bonding pressure stored in the at least one spring is applied to laminae.

34. (Original) The method of claim 17 where bonding laminae comprises prebonding a first stack of at least two laminae and prebonding a second stack of at least two laminae, the first stack and the second stack being subsequently bonded together.

35. (Previously presented) A method for bonding plural laminae together to form at least a portion of a microfluidic device, the method comprising:

providing a thermally assisted bonding device comprising a frame, a platen assembly and a load cell;

functionally associating laminae with the device; and

continuously bonding laminae together using the device and a conveyorized heating system.

36. (Original) The method according to claim 35 where bonding comprises forced convective heating, cooling or both.

37. (Original) The method according to claim 36 where convective heating and/or cooling is accomplished using forced inert gas flush.

38. (Original) The method according to claim 35 where functionally associating comprises stacking and registering the laminae on the device.

39. (Original) The method according to claim 38 where registering comprises thermally assisted registration.

40. (Original) The method according to claim 39 where thermally assisted registration comprises a registration device or lamina having a compliant registration element.

Claims 41-65 (Canceled).

66. (Previously presented) The method according to claim 17 where the thermally assisted bonding unit has at least one pressure regulating spring functionally associated with the unit to apply pressure to the laminae.

67. (Previously presented) The method according to claim 17 where the thermally assisted bonding unit further comprises:

a frame having a base plate, a top plate and support rods positioned between and coupling the base plate and the top plate, the fluid expansion unit being positioned between the base plate and top plate; and

a first platen and a second platen positioned between the at least one fluid expansion unit and the base plate, the first platen contacting an upper surface of the laminae and the second platen contacting a lower surface of the laminae.

68. (Previously presented) A method for bonding laminae together to form a device, comprising:

providing a thermally assisted bonding unit comprising a frame having a base plate, a top plate and support rods positioned between the base plate and the top plate, at least one fluidic expansion unit being positioned between the base plate and top plate, and a platen assembly for contacting the laminae, the thermally assisted bonding unit further comprising a load cell; and bonding laminae together using the device.

69. (Previously presented) The method according to claim 68 where the thermally assisted bonding unit further comprises a gap height adjustment screw coupled to the top plate.

70. (Previously presented) The method according to claim 69 wherein the bonding unit further comprises at least one engager which expands when the unit is heated such that gap height decreases, and wherein when the gap height is zero, a compressive force is applied to the laminae.

71. (Currently amended) [[The]] A method according to claim 70 for bonding laminae together to form a device, comprising:

providing a thermally assisted bonding unit comprising a frame having a base plate, a top plate having a gap height adjustment screw, support rods positioned between the base plate and the top plate, at least one fluidic expansion unit being positioned between the base plate and top plate, a platen assembly for contacting the laminae, a load cell, and where the thermally assisted bonding unit comprises plural engagers; and

bonding laminae together using the device.

72. (Previously presented) A method for bonding laminae together to form at least a portion of a microfluidic device, comprising:

providing a bonding unit comprising a frame, a platen assembly for applying a bonding pressure to laminae, and a load cell;

placing laminae in the bonding unit;

placing the bonding unit and laminae in a furnace;

heating the laminae to ± 50 °C of a bonding temperature; and

bonding the laminae together using the thermally assisted bonding unit.

73. (Previously presented) The method according to claim 72 wherein the load cell is preloaded with a bonding pressure.

74. (Currently amended) The method according to claim 72 where the load cell bonding unit, the furnace or both include [[is]] a fluidic load cell device to apply bonding pressure to the laminae.

75. (Previously presented) The method according to claim 72 where the load cell is a spring-based load cell.